

## Meeting of the TPC Evaluation and Study Group October 2, 2002

Present:

J. Dunlop, Y. Fisyak, A. Lebedev, T. Ljubicic, T. Ludlam, R. Majka, D. Reichold, N. Smirnov, B. Stringfellow, J. Thomas, H. Wieman

### Laser Track results

Tonko gave an hour-long noontime presentation of the latest results. Some of the main points:

- a. The new results, using the DAQ100 cluster finder, give reliable, reproducible track reconstruction: the lasers don't "jump around". Aleksei later showed similar results from the 2000 data.
- b. Precision of the reconstruction depends on laser intensity. Typical rms deviations are 30 microns for full magnetic field; 90 microns for field-off.
- c. Significant deviations are seen between field-on and field-off tracks.
- d. Conclusion: The lasers do appear to be an essential and powerful tool for diagnostics and calibration. There are a number of important details to be studied and understood, and a wealth of data to be analyzed. This effort needs a dedicated "Analyst" to work with the DAQ, TPC, analysis, and upgrade teams.

### Gated Grid operation at high rates

In a test during the past week, Blair Stringfellow has run the gated grid at 1500Hz, with no problems observed. We don't know what the upper limit is (Vahe Ghazikhanian is said to have estimated 5 KHz), but it appears that our announced goal of 1 KHz is not a problem.

Howard Wieman presented his calculated results on the frequency limit for operating the grid while still maintaining a complete block of the positive ions from the avalanche gain back into the drift volume. Briefly stated, his result is that this condition can be satisfied up to a frequency of 20 KHz. His presentation and analysis can be found at:

<http://www.star.bnl.gov/~wieman/GGwww/GatingGridFrequencyLimit.ppt>

Details at:

<http://www.star.bnl.gov/~wieman/GGwww/GatingGridPositiveIons.htm>

### Space Charge effects

Yuri Fisyak showed initial results from a study of charge distribution over the TPC volume derived from data in a central-trigger and a minbias run. His presentation can be found at:

<http://www.star.bnl.gov/~fisyak/star/PiD/SpaceCharge/TPC%20Space%20Charge.ppt>

These results need to be understood in terms of simple models for track production. There was some discussion of whether this analysis should be done with raw ADC data, rather than found clusters. Ultimately, this analysis should lead to a working model for space charge effects due to particle production in the TPC.

Jim Thomas showed results from new software tools now available for studying and tuning the space-charge corrections in the TPC. These allow one to specify the space-charge density as a function of radius by varying a few parameters.

Nikolai Smirnov showed some results of his studies of modified gas mixtures. He noted that a mixture of argon with 5% CF<sub>4</sub> can double the drift velocity while halving the diffusion rate, but would require a drift voltage roughly twice the present value. These studies are really aimed toward the next-generation TPC.

#### Monitoring the interaction and background rates

Dick Majka showed some results from his studies of correlations between the RICH scalar (MULT) and ZDC coincidences. The results look quite different from fill to fill. Dick has also succeeded in getting data from CAD's beam vacuum monitor database. The idea is to see if we can correlate vacuum excursions with high background rates at STAR. So far, it appears that the vacuum data show no significant fluctuations, but this merits more exploration. Dick is next going to look into CAD's collimator data base. He and Jamie are looking into means to re-create the MULT scalar function for the upcoming run. This scalar counts coincidences among CTB elements, indicative of beam-related backgrounds.

#### Next Meeting

We agreed to meet in ~1 month to continue updating progress. The tentative date is Wednesday, November 6.